European and Mediterranean Plant Protection Organisation
Organisation Européenne et Méditerranéenne pour la Protection des Plantes

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This PRA document was modified in 2021 to clarify the phytosanitary measures recommended

Pest Risk Analysis record for *Megaplatypus mutatus*

PEST RISK ANALYSIS FOR ***Megaplatypus mutatus***			
Pest risk analyst(s):	EWG for performing PRA on Megaplatypus mutatus		Gianni ALLEGRO (Mr) IT, Hugh EVANS (Mr) GB, Rosana GIMENEZ (Mrs) AR, Raffaele GRIFFO (Mr) IT, Antti POUTTU (Mr) FI, Karl THUNES (Mr) NO EPPO Secretariat
			The EWG tried to support its judgement with references. When no references were available, the judgement was made by consensus within the EWG.
Date: 2007-01-10/12			
Stage 1: Initiation			
1 What is the reason for performing the PRA?			An established infestation of *Megaplatypus mutatus* has been discovered in the PRA area: An outbreak was detected in Italy near Caserta (Campania) in 2000 (Tremblay *et al.*, 2000). This pest has been listed on the EPPO Alert List in 2004-04. The Working Party on Phytosanitary Regulations recommended that an Expert Working Group should be constituted to perform a PRA on this pest.
2 Enter the name of the pest			*Megaplatypus mutatus (*syn. *Platypus sulcatus*, *Platypus mutatus, Platypus plicatus* (Wood & Bright, 1992, Bright & Skidmore, 1997). It is referred to as *Megaplatypus parasulcatus* by Kliejunas *et al* (2001*)* in the USDA Pest Risk Assessment of the importation into the United States of unprocessed *Eucalyptus* logs and chips from South America but this is not a recognized synonym.
2a Indicate the type of the pest			Insect
2b Indicate the taxonomic position			Coleoptera: Curculionidae, Platypodinae
3 Clearly define the PRA area			EPPO region
4 Does a relevant earlier PRA exist?			No

5 Is the earlier PRA still entirely valid, or only partly valid (out of date, applied in different circumstances, for a similar but distinct pest, for another area with similar conditions)?		
Stage 2A: Pest Risk Assessment - Pest categorization		
<u>Identify the pest (or potential pest)</u>		
6 Does the name you have given for the organism correspond to a single taxonomic entity which can be adequately distinguished from other entities of the same rank?	yes	
7 Even if the causal agent of particular symptoms has not yet been fully identified, has it been shown to produce consistent symptoms and to be transmissible?		
<u>Determining whether the organism is a pest</u>		
8 Is the organism in its area of current distribution a known pest (or vector of a pest) of plants or plant products?	yes	In its area of origin (South America) it is considered to be an important pest of poplar and other tree genera (Alfaro 2003, Giménez & Etiennot 2003, Marquina *et al*. 2006).
9 Does the organism have intrinsic attributes that indicate that it could cause significant harm to plants?		
<u>Presence or absence in the PRA area and regulatory status (pest status)</u>		
10 Does the pest occur in the PRA area?	yes	The pest has been present in Campania, Italy since 2000 (Tremblay *et al*, 2000).
11 Is the pest widely distributed in the PRA area?	No	The pest has not been reported in another EPPO country
<u>Potential for establishment and spread in the PRA area</u>		
12 Does at least one host-plant species (for pests directly affecting plants) or one suitable habitat (for non parasitic plants) occur in the PRA area (outdoors, in protected cultivation or both)?	yes	*Megaplatypus mutatus* is a polyphagous pest (Giménez & Etiennot, 2003). Many host plants occur in the PRA area.

13 If a vector is the only means by which the pest can spread, is a vector present in the PRA area? (if a vector is not needed or is not the only means by which the pest can spread go to 14)	Not relevant	
14 Does the known area of current distribution of the pest include ecoclimatic conditions comparable with those of the PRA area or sufficiently similar for the pest to survive and thrive (consider also protected conditions)?	Yes	The existence of an established population in Italy indicates that there are ecoclimatic conditions suitable in the PRA area (Tremblay *et al*, 2000).
Potential for economic consequences in PRA area.		
15 With specific reference to the plant(s) or habitats which occur(s) in the PRA area, and the damage or loss caused by the pest in its area of current distribution, could the pest by itself, or acting as a vector, cause significant damage or loss to plants or other negative economic impacts (on the environment, on society, on export markets) ?	yes	Damages are recorded in South America on many tree species (Santoro 1962, Etiennot *et al* 1998, Giménez & Etiennot 2003). Damage is recorded in Italy on many tree genera, in particular *Populus*, *Corylus*, *Malus*, *Pyrus, Castanea, Juglans, Prunus, Quercus, Eucalyptus* (Carella & Spigno 2002, Italian NPPO region Campania, survey results 2005-2006).
Conclusion of pest categorization		
16 This pest could present a risk to the PRA area.	YES	
17 The pest does not qualify as a quarantine pest for the PRA area and the assessment for this pest can stop (summarize the main reason for stopping the analysis)		

Section 2B: Pest Risk Assessment - Probability of introduction/spread and of potential economic consequences		
1. Probability of introduction **Introduction, as defined by the FAO Glossary of Phytosanitary Terms, is the entry of a pest resulting in its establishment.**		
Probability of entry of a pest		
<u>Identification of pathways</u> Note: If the most important pathway is intentional import, do not consider entry, but go directly to establishment. Spread from the intended habitat to the unintended habitat, which is an important judgement for intentionally imported organisms, is covered by questions 1.33 and 1.35.		Hosts recorded in South America *Acacia, Acer*; *Ailanthus, Citrus, Eucalyptus, Fraxinus, Laurus, Ligustrum, Liquidambar, Magnolia, Malus, Melia, Pinus, Platanus, Populus, Prunus, Pyrus, Quercus, Robinia, Salix, Taxodium, Tilia, Ulmus (*Gimenez & Etiennot, 2003) Additional hosts recorded in Italy *Juglans, Corylus, Castanea.(*Griffo, personal communication, 2007*)*
1.1 Consider all relevant pathways and list them		The relevant pathways are: Origin concerned Argentina, Brazil, Uruguay, Paraguay, Bolivia, French Guiana, Peru, Venezuela and Campania (Italy) • Wood of host plants of *M. mutatus*: The EWG considered that round wood (with or without bark) and sawn wood should both be considered as pathways. Nevertheless the risk presented by sawn wood was perceived to be lower because the survival of larvae in sawn wood will be lower as humidity declines. The genera mostly traded as wood are *Acer, Eucalyptus, Pinus, Platanus, Populus, Quercus, Ulmus, Juglans, Balfourodendron, Cedrela, Castanea.* • Wood Packaging material There is evidence that platypodids have been found in wood packaging material (Haack, 2006)

		• Plants for planting of woody hosts of more than 15 cm diameter. According to the literature the pest usually only attacks plants of more than 15 cm diameter (Etiennot *et al* 1998, Casaubon *et al* 2002, Casaubon & Fracassi 1999). Trade of large plants presents a risk, but not young woody plants. There is a growing trade in large plants for landscaping (e.g. *Quercus, Castanea*) • Natural spread The adult is not a very good flyer. Although precise data on flight are not available dispersal is regarded as local only (generally not more than 100 m for a few individuals when there is a large infestation). After emergence the adult has to find a new host within a maximum of 5 days (Santoro, 1963).
1.2 Estimate the number of relevant pathways, of different commodities, from different origins, to different end uses.	Moderate number	26 genera from 9 countries and 4 commodity types 936 pathways.
1.3 Select from the relevant pathways, using expert judgement, those which appear most important. If these pathways involve different origins and end uses, it is sufficient to consider only the realistic worst-case pathways. The following group of questions on pathways is then considered for each relevant pathway in turn, as appropriate, starting with the most important.		
Pathway n°:1		Plants for planting of host-plant (diameter more than 15 cm)
<u>Probability of the pest being associated with the individual pathway at origin.</u>		
1.4 How likely is the pest to be associated with the pathway at origin?	likely	The EWG considered that theoretically if a nursery with large host plants was located in an area where the pest was present the plants could be attacked.
1.5 Is the concentration of the pest on the pathway at origin likely to be high, taking into account factors like cultivation practices, treatment of consignments	unlikely	Nursery practices are considered sufficient to detect an infestation as evidenced by the production of sawdust (inspection of the trunks).

1.6 How large is the volume of the movement along the pathway?	minimal	There is no evidence of trade of this type of plant from the areas where the pest is present. (Trade of large plants is nevertheless increasing). In Campania, nurseries are mainly producing fruit trees (Italian NPPO, region Campania, 2007). Trade of large plants from South America was assumed by the EWG to be minimal. Data from AIPH (2005) do not give precise indications on the genera concerned and groups all ornamentals together (cutting, trees….).
1.7 How frequent is the movement along the pathway?	Very rarely	This trade is not thought to be frequent.
<u>Probability of survival during transport or storage</u>		
1.8 How likely is the pest to survive during transport /storage?	Very likely	The pest is protected within the plant and can complete its life cycle there.
1.9 How likely is the pest to multiply/increase in prevalence during transport /storage?	Very unlikely	The plants are usually not transported during active growth so the pest is unlikely to multiply during transport or storage.
<u>Probability of the pest surviving existing pest management procedures</u>		
1.10 How likely is the pest to survive or remain undetected during existing phytosanitary measures?	Unlikely	The EU Directive includes general provision regarding plants for planting (point 39). These measures are required in 27 EPPO members plus countries which have legislation aligned to the EU (ie Norway, Switzerland, Turkey). In all EPPO countries a PC is required for the import of Plants for planting, thus implying an export inspection. An import permit is often required in other EPPO member countries. It is considered that careful visual examination of the plants for presence of holes and sawdust should enable an inspector to detect the pest. Nevertheless the presence of holes or sawdust may be the result of attack by other insects. The mean diameter of galleries of *M. mutatus* is 4.5 mm (Giménez, 2001), but the diameter of larvae is 2.5 mm (Santoro 1963, 1965). Within EU countries, with the exception of protected zones, most of the host plant genera can move freely (no plant passport required) (EU, Plant Health Directive 2000-29)
1.11 In the case of a commodity pathway, how widely is the commodity to be distributed throughout the PRA area?	Widely	Given the number of host plants, it is assumed that infested plants can be distributed throughout the region.
1.12 In the case of a commodity pathway, do consignments arrive at a suitable time of year for pest establishment?	yes	The time of arrival is not relevant as the pest will survive in the host plant and continue its development when conditions are suitable (it might imply a longer duration of the cycle).
1.13 How likely is the pest to be able to	Very likely	Plants for planting will be planted near to potential host plants and the pest will be able to

transfer from the pathway to a suitable host or habitat?		transfer to them as it is polyphagous.
1.14 In the case of a commodity pathway, how likely is the intended use of the commodity (e.g. processing, consumption, planting, disposal of waste, by-products) to aid transfer to a suitable host or habitat?	Very likely	Planting is the intended use and it is very likely to aid transfer.
<u>Consideration of further pathways</u>		
1.15 Do other pathways need to be considered?	YES	
Pathway n°:2		Round Wood of host plants
<u>Probability of the pest being associated with the individual pathway at origin.</u>		
1.4 How likely is the pest to be associated with the pathway at origin?	Very likely	In Argentina on average of 4 to 40% of trees are attacked in infested areas (Giménez *et al* 2004).
1.5 Is the concentration of the pest on the pathway at origin likely to be high, taking into account factors like cultivation practices, treatment of consignments	Likely	The concentration of the pest on the pathway at origin largely depends on producers' management. With an intensive treatment programme in the field the pest population may be significantly reduced.
1.6 How large is the volume of the movement along the pathway?	Moderate	Volume in cubic meters of imports of industrial round wood of non conifer for Europe are 26 381 284 (FAOSTATS 2005) Although specific data are not available for imports of particular genera, it is known that *Eucalyptus* wood from South America is exported to Finland (191 000 cubic meters of wood with bark originating in Uruguay in 2006) and Norway (600 000 cubic meters from South America (Houen, 2004). Round wood of *Eucalyptus* is used in paper production because of its fibre content per unit weight (almost 10 fold compared to conifer wood) (Houen, 2004).
1.7 How frequent is the movement along the pathway?	Often	*Eucalyptus* wood is imported regularly from South America.
<u>Probability of survival during transport or storage</u>		
1.8 How likely is the pest to survive during transport /storage?	Likely	The pest is in the wood but humidity may be a limiting factor during the early stages of development.
1.9 How likely is the pest to multiply/increase in prevalence during	Very unlikely	The pest will not multiply or increase in wood. The pest lays eggs only on living trees.

transport /storage?		
Probability of the pest surviving existing pest management procedures		
1.10 How likely is the pest to survive or remain undetected during existing phytosanitary measures?	Likely	Wood of most host plant genera is not regulated, thus no inspection is required. Current requirements for *Populus* in the EU plant health directive are that wood should be either debarked or has undergone kiln-drying to below 20% humidity. For conifers, the requirements are that the wood should be bark-free and free from grub holes of more than 3 mm or kiln-dried or heat treated or fumigated or have undergone chemical pressure impregnation. The debarking requirement alone is not sufficient to prevent the risk from *Megaplatypus mutatus*. The size of the holes produced by *M. mutatus* is 3 mm so this measure will also not be efficient for this pest.
1.11 In the case of a commodity pathway, how widely is the commodity to be distributed throughout the PRA area?	Widely	Round wood is imported throughout the EPPO region.
1.12 In the case of a commodity pathway, do consignments arrive at a suitable time of year for pest establishment?	YES	Round wood is imported at any time.
1.13 How likely is the pest to be able to transfer from the pathway to a suitable host or habitat?	Very likely	Processing companies are usually located near to plantations (e.g. in the case of poplar). Round Wood is usually stored outside for some months (sometimes with watering which does not affect survival of wood borers) before being processed. This could allow the pest to emerge and attack local host genera, particularly since it is polyphagous.
1.14 In the case of a commodity pathway, how likely is the intended use of the commodity (e.g. processing, consumption, planting, disposal of waste, by-products) to aid transfer to a suitable host or habitat?	Very unlikely	The most favoured uses for poplar are pulp, paper and cardboard (Ball *et al*, 2005). Poplar is also largely used for plywood production (Allegro personal communication 2007). All processing will destroy the pest.
Consideration of further pathways		
1.15 Do other pathways need to be considered?	yes	
Pathway n°:3		Sawn Wood of host plants
Probability of the pest being associated with the individual pathway at origin.		
1.4 How likely is the pest to be associated	Very likely	In Argentina on average 4 to 40% of trees are attacked in infested areas.

with the pathway at origin?		
1.5 Is the concentration of the pest on the pathway at origin likely to be high, taking into account factors like cultivation practices, treatment of consignments	Moderately likely	The concentration of the pest on sawn wood at origin will be less than for round wood because of the process of sawing the wood and the quicker drying of material.
1.6 How large is the volume of the movement along the pathway?	Moderate	Volume in cubic meters of imports of industrial sawn wood in 2005 was 8 108 165 (FAOSTATS 2005). Specific data are not available for imports of particular genera,
1.7 How frequent is the movement along the pathway?	Often	Sawn wood is imported regularly.
<u>Probability of survival during transport or storage</u>		
1.8 How likely is the pest to survive during transport /storage?	Moderately likely	The pest is unlikely to survive in sawn wood because of declining humidity which is adverse to larvae (Alfaro personal communication 2007), although specific studies have not been conducted to quantify it. Sawn wood does also include big baulks or planks and not only boards. In this respect the humidity argument may be less important.
1.9 How likely is the pest to multiply/increase in prevalence during transport /storage?	Very unlikely	The pest does not multiply.
<u>Probability of the pest surviving existing pest management procedures</u>		
1.10 How likely is the pest to survive or remain undetected during existing phytosanitary measures?	Likely	Wood of most host plant genera is not regulated thus no inspection is required. Current requirements for *Populus* in the EU plant health directive are that wood should be either debarked or has undergone kiln-drying to below 20% humidity. These requirements are not sufficient to prevent the risk from *Megaplatypus mutatus*. For conifers, the requirements are that the wood should be bark-free and free from grub holes of more than 3 mm or kiln-dried or heat treated or fumigated or have undergone chemical pressure impregnation. The debarking requirement alone is not sufficient to prevent the risk from *Megaplatypus mutatus*. The size of the holes produced by *M. mutatus* can be less than 3 mm so this measure will also not be efficient for this pest. Infestations are easier to detect on sawn wood because of the coloration of wood around the feeding tunnels “pinholes” due to the associated fungus.
1.11 In the case of a commodity pathway, how widely is the commodity to be distributed throughout the PRA area?	Widely	Sawn wood is imported throughout the EPPO region.
1.12 In the case of a commodity pathway, do	YES	Sawn wood is imported at any time

consignments arrive at a suitable time of year for pest establishment?		
1.13 How likely is the pest to be able to transfer from the pathway to a suitable host or habitat?	Unlikely	Sawn wood is usually stored inside or wrapped and there is less opportunity for emerging adults to find potential host trees.
1.14 In the case of a commodity pathway, how likely is the intended use of the commodity (e.g. processing, consumption, planting, disposal of waste, by-products) to aid transfer to a suitable host or habitat?	Unlikely	All end uses for sawn wood will accelerate drying. The most favoured uses for sawn wood are structural wood, furniture, floorings, boats, wood packaging material).
<u>Consideration of further pathways</u>		
1.15 Do other pathways need to be considered?	YES	
Pathway n°:3		Wood Packaging Material
		ISPM 15 states that "wood packaging material is frequently made of raw wood that may not have undergone sufficient processing or treatment to remove or kill pests and therefore becomes a pathway for the introduction and spread of pests". There are records of detection of platypodids in wood-packaging material. The EWG considered that a detailed analysis of this pathway was not necessary as compliance of wood-packaging material with ISPM 15 is an appropriate measure for this pest. ISPM 15 has been adopted and describes globally accepted measures that are approved and that may be applied to wood packaging material by all countries to practically eliminate the risk for most quarantine pests and significantly reduce the risk from a number of other pests that may be associated with that material. Platypodids are pest groups associated with wood packaging material that are practically eliminated by the treatments described in ISPM 15.
<u>Consideration of further pathways</u>		
1.15 Do other pathways need to be considered?	NO	

<table>
<tr><td colspan="3"><u>Conclusion on the probability of entry</u></td></tr>
<tr><td>The overall probability of entry should be described and risks presented by different pathways should be identified.</td><td></td><td>The expert working group considered that the possibility of entry of the pest was low. The introduction to Italy might be linked to a single trial shipment of poplar round wood with bark from an area infested by M. mutatus in Argentina in 1998 (Giménez, personal communication 2007). The wood concerned was found to be damaged by ambrosia beetles although there is no evidence that living M. mutatus was present. No further exports of this type of material have been recorded from Argentina.

Risks of entry presented by the different pathways are ranked as follows

Medium
• Round wood of host plants of M. mutatus.

Low
• Plants for planting of woody hosts of more than 15 cm diameter (because the area of Italy where the pest is present does not have nurseries producing large trees for planting). This would be much higher if cultivation of large trees was carried out in the infested area.

Very low
• Sawn wood of host plants of M. mutatus.

Wood Packaging material presents a risk (risk for dunnage being similar to round wood whereas the risks for other WPM components are similar to sawn wood) but the EWG considered that WPM compliant with ISPM 15 presents a very low risk of entry of M. mutatus.</td></tr>
<tr><td colspan="3">Probability of Establishment</td></tr>
<tr><td colspan="3"><u>Availability of suitable hosts or suitable habitats, alternate hosts and vectors in the PRA area</u></td></tr>
<tr><td>1.16 a Specify the host plant species (for pests directly affecting plants) or suitable habitats (for non parasitic plants) present in the PRA area.</td><td></td><td>Host plants recorded in South America and present in the PRA area
Acacia, Acer; Ailanthus, Citrus, Eucalyptus, Fraxinus, Laurus, Ligustrum, Liquidambar, Magnolia, Malus, Melia, Pinus, Platanus, Populus, Prunus, Pyrus, Quercus, Robinia, Salix, Taxodium, Tilia, Ulmus (Etiennot et al 1998)

Additional hosts recorded in Italy</td></tr>
</table>

		Juglans, Corylus, Castanea (Griffo, personal communication, 2007)
1.16 b Estimate the number of host plant species or suitable habitats in the PRA area.	Very Many	These genera are very common forestry, ornamental or fruit trees.
1.17 How widespread are the host plants or suitable habitats in the PRA area? (specify)	Very widely	Widespread throughout the region.
1.18 If an alternate host is needed to complete the life cycle, how widespread are alternate host plants in the PRA area?	Not relevant	
1.19 If the pest requires another species for critical stages in its life cycle such as transmission, (e.g. vectors), growth (e.g. root symbionts), reproduction (e.g. pollinators) or spread (e.g. seed dispersers), how likely is the pest to become associated with such species?	Not relevant	
Suitability of the environment		
1.19A Specify the area where host plants (for pests directly affecting plants) or suitable habitats (for non parasitic plants) are present (cf. QQ 1.16-1.19). This is the area for which the environment is to be assessed in this section. If this area is much smaller than the PRA area, this fact will be used in defining the endangered area.		Whole EPPO region
1.20 How similar are the climatic conditions that would affect pest establishment, in the PRA area and in the current area of distribution?		Using CLIMEX, a match climate between Napoli (Italy) and the EPPO region shows that the coasts of the following Mediterranean countries have a match index up to 70% of similarities and have therefore a largely similar climate to the place of establishment of the pest in Italy: Albania, Algeria, Croatia, France, Greece, (Italy), Portugal, Spain, Turkey (see annexe 1).
1.21 How similar are other abiotic factors that would affect pest establishment, in the PRA area and in the current area of		There are no known other abiotic factors that would affect establishment of the pest.

distribution?		
1.22 If protected cultivation is important in the PRA area, how often has the pest been recorded on crops in protected cultivation elsewhere?	Not relevant	
1.23 How likely is that establishment will not be prevented by competition from existing species in the PRA area?	Very likely	No other species in the region are likely to compete with *M mutatus*, particularly since it is a pest of living trees, unlike most other ambrosia beetles. Cerambycid beetles are present at low population levels but are unlikely to compete for resources. In addition *M. mutatus* is a polyphagous species and can exploit alternative hosts.
1.24 How likely is that establishment will not be prevented by natural enemies already present in the PRA area?	Very likely	Only generalist predators are known for this pest and they are very unlikely to prevent establishment.
<u>Cultural practices and control measures</u>		
1.25 To what extent is the managed environment in the PRA area favourable for establishment?	Highly favourable	
1.26 How likely is it that existing control or husbandry measures will fail to prevent establishment of the pest?	Very likely	The management of host trees tends to favour rapid growth and, therefore, favour the pest indirectly.
1.27 How likely is it that the pest could survive eradication programmes in the PRA area?	Very likely	*M. mutatus* is a very polyphagous pest, eradication would require that the infestation is detected at an early stage and an intensive survey programme of potential host plants is put in place, followed by destruction of infested plants.
<u>Other characteristics of the pest affecting the probability of establishment</u>		
1.28 How likely is the reproductive strategy of the pest and the duration of its life cycle to aid establishment?	Unlikely	The pest has only one cycle per year. In the warmest areas in Argentina, it is known that it can start a second generation but with no success (Santoro, 1965). It is known to have a very low rate of success in penetrating and reproducing in a tree (Giménez, 2007 personal communication).
1.29 How likely are relatively small populations or populations of low genetic diversity to become established?	No judgement	Nothing is known on the genetic diversity.
1.30 How adaptable is the pest? Adaptability is:	High adaptability	It has a wide geographic range and is polyphagous and so is perceived to be very adaptable
1.31 How often has the pest been introduced	Very rarely	The pest is present in South America and has been introduced to Italy where it is assumed

into new areas outside its original area of distribution? (specify the instances, if possible)		to be linked to a single entry.
1.32 Even if permanent establishment of the pest is unlikely, how likely are transient populations to occur in the PRA area through natural migration or entry through man's activities (including intentional release into the environment) ?	N/A	
Conclusion on the probability of establishment		
The overall probability of establishment should be described.		The pest is already established in a restricted part of the EPPO region. Climatic conditions in the EPPO region are suitable and host plants are widely distributed. The probability of establishment is high in the countries identified in question 1.20.
Probability of spread		
1.33 How likely is the pest to spread rapidly in the PRA area by natural means?	unlikely	Spread in Italy has been limited and suggests a slow rate of natural dispersal. The pest was detected in 2000 in Campania in the province of Caserta and it is still restricted to this area in 2006 (Italian NPPO region Campania Survey results 2005-2006).
1.34 How likely is the pest to spread rapidly in the PRA area by human assistance?	likely	If the wood or plants for planting from an infested area are transported into new locations, they will spread the pest.
1.35 How likely is it that the spread of the pest will not be contained within the PRA area?	likely	Although natural spread will be slow, containment of the pest is not easy and prevention of long distance spread depends on introducing suitable measures to restrict movement of infested material.
Conclusion on the probability of spread		
The overall probability of spread should be described.		The probability of spread is low to medium
Conclusion on the probability of introduction and spread		
The overall probability of introduction and spread should be described. The probability of introduction and spread may be expressed by comparison with PRAs on other pests.		The overall probability of introduction and spread is medium.

Conclusion regarding endangered areas		
1.36 Based on the answers to questions 1.16 to 1.35 identify the part of the PRA area where presence of host plants or suitable habitats and ecological factors favour the establishment and spread of the pest to define the endangered area.		The polyphagous nature of the pest indicates that availability of host plants will not restrict its future distribution in the PRA area. It appears that many parts of the PRA area are climatically suitable, but further detail is required on this aspect in order to define the endangered area more precisely. Considering the CLIMEX study undertaken, both compare location and match climate functions, though having a high degree of uncertainty give the same indications concerning the endangered area. The Mediterranean coasts are most likely to be at risk, this is confirmed by the fact the species settled in Caserta. The EPPO countries at risk are therefore: Albania, Algeria, Croatia, France, Greece (including Crete), Egypt, Israel, Italy, Lebanon, Montenegro, Morocco, Palestine, Portugal, Romania, Serbia, Spain, Syria, Tunisia, Turkey. Considering that the species may have a lower degree day per generation requirement than expected, additional countries and provinces may be at risk: the Pianura Padana in Italy there is where extensive production of poplar, Austria, Azerbaijan, Bulgaria, Georgia, Hungary, Moldova, Republic of Macedonia, Romania, Russia, Slovakia, Slovenia, Ukraine. (See annexe 1)
2 Assessment of potential economic consequences		
2.0 In any case, providing replies for all hosts (or all habitats) and all situations may be laborious, and it is desirable to focus the assessment as much as possible. The study of a single worst-case may be sufficient. Alternatively, it may be appropriate to consider all hosts/habitats together in answering the questions once. Only in certain circumstances will it be necessary to answer the questions separately for specific hosts/habitats.		Because of its importance to the region of Italy where the pest has established, the main host plant studied is the genus *Populus*, but reference is also made to other host-plant genera.

Pest effects		
2.1 How great a negative effect does the pest have on crop yield and/or quality to cultivated plants or on control costs within its current area of distribution?	Major	In Argentina it has an effect mainly on the quality of wood of *Populus* and can cause stem breakage (Alfaro, 2003). Similar damage are recorded in Campania (Italy) where, in addition, reduction in fruit production (*Malus, Corylus*) is noted as well as tree mortality (*Corylus*) (Griffo personal communication, 2007).
2.2 How great a negative effect is the pest likely to have on crop yield and/or quality in the PRA area?	Major	Similar damage would occur in the PRA area.
2.3 How great an increase in production costs (including control costs) is likely to be caused by the pest in the PRA area?	Major	Increased surveillance and more insecticide treatments are likely to be required to control this pest (trunk injections or local holes treatments) (Giménez & Etiennot 2002, Giménez 2006, Gimenez and Panzardi 2003)
2.4 How great a reduction in consumer demand is the pest likely to cause in the PRA area?	Minimal	Not likely to have an effect on consumer demand.
2.5 How important is environmental damage caused by the pest within its current area of distribution?	Minimal	It is threatening an area of protected trees (*Salix*) in Argentina
2.6 How important is the environmental damage likely to be in the PRA area?	Minor	*Quercus* is not a common plant in South America but it is it is an important plant in the EPPO region. Attack on *Quercus* would cause environmental damage, but also on other trees found in the wild such as *Populus, Castanea, Salix, Pinus, Fraxinus*, etc.
2.7 How important is social damage caused by the pest within its current area of distribution?	Minimal	Some poplar producers have lost their high quality wood market and have been obliged to diversify their activity to maintain their income or have lost income because of trading lower quality product. In addition some local production of traditional willow baskets is threatened in Argentina (Giménez, personal communication 2007).
2.8 How important is the social damage likely to be in the PRA area?	Minor	If *M. mutatus* is introduced to an area, some growers might stop producing high quality poplar wood. Loss of aesthetic value in the wider landscape or in woodland parks may occur.
2.9 How likely is the presence of the pest in the PRA area to cause losses in export markets?	Likely	As it is a polyphagous pest it could affect a wide range of host genera some of which are currently exported. Establishment of the pest may, therefore, have an effect on export markets because of concerns about spreading it to new countries.
2.9A As noted in the introduction to section 2, the evaluation of the following questions may not be necessary if any of the responses to questions 2.2, 2.3, 2.4, 2.6 2.8 or 2.9 is		

“major or massive” or "very likely” or "certain". You may go directly to point 2.16 unless a detailed study of impacts is required.		
2.10 How easily can the pest be controlled in the PRA area?		
2.11 How likely is it that natural enemies, already present in the PRA area, will not suppress populations of the pest if introduced?		
2.12 How likely are control measures to disrupt existing biological or integrated systems for control of other pests or to have negative effects on the environment?		
2.13 How important would other costs resulting from introduction be?		
2.14 How likely is it that genetic traits can be carried to other species, modifying their genetic nature and making them more serious plant pests?		
2.15. How likely is the pest to act as a vector or host for other pests?		
2.15A Do you wish to consider the questions 2.1 to 2.15 again for further hosts/habitats?	No	
Conclusion of the assessment of economic consequences		
2.16 Referring back to the conclusion on endangered area (1.36), identify the parts of the PRA area where the pest can establish and which are economically most at risk.		The economic impact is likely to be high.
Degree of uncertainty		
Estimation of the probability of introduction of a pest and of its economic consequences involves many uncertainties. In particular, this estimation is an extrapolation from the		Spread capacity (flight capacity); too little is known about the dispersal capacity of the adult beetles. Existence of natural enemies; there is very limited knowledge about natural control factors in either its native range or in Italy.

situation where the pest occurs to the hypothetical situation in the PRA area. It is important to document the areas of uncertainty and the degree of uncertainty in the assessment, and to indicate where expert judgement has been used. This is necessary for transparency and may also be useful for identifying and prioritizing research needs. It should be noted that the assessment of the probability and consequences of environmental hazards of pests of uncultivated plants often involves greater uncertainty than for pests of cultivated plants. This is due to the lack of information, additional complexity associated with ecosystems, and variability associated with pests, hosts or habitats.		Success of reproduction on different host plants; although regarded as highly polyphagous, there is relatively limited knowledge on reproductive rates on different hosts. Data on non compliance notifications for platypodids and not species specific; the limited data on movement of platypodids in international trade do not provide sufficient information to quantify movements along the different pathways. Survival of the pest in sawn wood; information from researchers in South America and in Canada (Alfaro, personal communication) suggests that the pest does not survive well in sawn wood. However, further information is required on this aspect. Behaviour of the pest in Campania; the pest is relatively new to Italy and biological parameters suitable to improve risk analysis for Europe would be valuable. Specific data on trade of host plant commodities; more detail is needed on the volumes of different plant genera in the different pathway categories. There is uncertainty about the necessary thermal requirements of the pest. The only available data are from a single population.
Conclusion of the pest risk assessment		
Entry: Evaluate the probability of entry and indicate the elements which make entry most likely or those that make it least likely. Identify the pathways in order of risk and compare their importance in practice.		Probability of entry is low • Plants for planting of host plants of more than 15 cm diameter: low • Round Wood of host plants of *M. mutatus*: medium • Sawn wood of host plants of *M. mutatus*: very low • Wood packaging material: very low The probability of entry is considered to be low mainly because few commodities are imported from the areas where the pest is present. The pest is only likely to survive in living trees or round wood. Nevertheless it should be noted that it is suspected that one single trial consignment of round wood of *Populus* with bark may have resulted in the introduction of the pest to the Campania region in Italy.
Establishment Evaluate the probability of establishment,		Probability of establishment is high in Albania, Algeria, Croatia, France, Greece

and indicate the elements which make establishment most likely or those that make it least likely. Specify which part of the PRA area presents the greatest risk of establishment.		(including Crete), Egypt, Israel, Italy, Lebanon, Montenegro, Morocco, Palestine, Portugal, Romania, Serbia, Spain, Syria, Tunisia, Turkey (see annexe 1).
Economic importance List the most important potential economic impacts, and estimate how likely they are to arise in the PRA area. Specify which part of the PRA area is economically most at risk.		The economic impact is high Main impact is on wood quality but reductions in production have also been noted for fruit trees.
Overall conclusion of the pest risk assessment The risk assessor should give an overall conclusion on the pest risk assessment and an opinion as to whether the pest or pathway assessed is an appropriate candidate for stage 3 of the PRA: the selection of risk management options, and an estimation of the pest risk associated.		The pest presents a risk for the Mediterranean coastal area and management measures should be considered.
This is the end of the Pest risk assessment		

Stage 3: Pest risk Management		
3.1. Is the risk identified in the Pest Risk Assessment stage for all pest/pathway combination an acceptable risk?	No	
Pathway n°1		Plants for planting of host plants of more than 15 cm diameter
3.2. Is the pathway that is being considered a commodity of plants and plant products?	Yes	
Existing phytosanitary measures		
3.10. Are there any existing phytosanitary measures applied on the pathway that could prevent the introduction of the pest	Yes for some EPPO Countries	The EU Directive includes general provision regarding plants for planting (point 39). These measures are required in 27 EPPO members plus countries which have legislation aligned to the EU (i.e. Norway, Switzerland, Turkey) In all EPPO countries a PC is required for the import of Plants for Planting thus implying an export inspection. An import permit is often required in other EPPO member countries. Within EU countries, with the exception of protected zones, most host plant genera can be moved freely (no plant passport required).
Identification of appropriate risk management options		
Options for consignments		
<u>Detection of the pest in consignments by inspection or testing</u>		
3.11. Can the pest be reliably detected by a visual inspection of a consignment at the time of export during transport/storage or at import?	No	It is considered that careful visual examination of the plants for presence of holes and sawdust should enable an inspector to detect the pest <u>but this is only valid</u> for the active period of the insect. The presence of holes or sawdust may be the result of attack by other insects and sawdust may not be visible anymore after a rainfall.
3.12. Can the pest be reliably detected by testing (e.g. for pest plant, seeds in a consignment)?	No relevant	
3.13. Can the pest be reliably detected during post-entry quarantine?	No	It is not common practice in EPPO countries
<u>Removal of the pest from the consignment by treatment or other phytosanitary procedures</u>		

3.14. Can the pest be effectively destroyed in the consignment by treatment (chemical, thermal, irradiation, physical)?	No	There is no information on treatments of consignments for this pest.
3.15. Does the pest occur only on certain parts of the plant or plant products (e.g. bark, flowers), which can be removed without reducing the value of the consignment? (This question is not relevant for pest plants)	Not relevant	
3.16. Can infestation of the consignment be reliably prevented by handling and packing methods?	No	
<u>Prevention of establishment by limiting the use of the consignment</u>		
3.17. Could consignments that may be infested be accepted without risk for certain end uses, limited distribution in the PRA area, or limited periods of entry, and can such limitations be applied in practice?	No	Not for this pathway
Options for the prevention or reduction of infestation in the crop		
<u>Prevention of infestation of the commodity</u>		
3.18. Can infestation of the commodity be reliably prevented by treatment of the crop?	Yes	Chemical treatment of trees is possible (topical applications) and is performed on poplar stands in Argentina. Nevertheless, no data is available on efficacy and holes are difficult to see. The level of protection for this measure is considered to be lower.
3.19. Can infestation of the commodity be reliably prevented by growing resistant cultivars? (This question is not relevant for pest plants)	No	Polyphagous pest
3.20 Can infestation of the commodity be reliably prevented by growing the crop in specified conditions (e.g. protected conditions such as screened greenhouses, physical isolation, sterilized growing medium, exclusion of running water...)?	Yes	Attack can be prevented with physical protection such as a plastic wrapping or loose nets around the trunks, this method has been used in Italy and prevented attacks on *Prunus cerasus*, even on trees of more than 15 cm in diameter (Griffo personal communication 2007).

3.21. Can infestation of the commodity be reliably prevented by harvesting only at certain times of the year, at specific crop ages or growth stages?	No	
3.22. Can infestation of the commodity be reliably prevented by production in a certification scheme (i.e. official scheme for the production of healthy plants for planting)?	No	
Establishment and maintenance of pest freedom of a crop, place of production or area		
3.23. Has the pest a very low capacity for natural spread?		
3.24. Has the pest a low to medium capacity for natural spread?	Yes	The pest is not a good flyer (see question 1.1) Pest-free place of production or pest-free area
3.25. Has the pest a medium capacity for natural spread?		
3.26. The pest is of medium to high capacity for natural spread		
3.27. Can pest freedom of the crop, place of production or an area be reliably guaranteed?	Yes	The immediate vicinity should be free from the pest (up to 200 meter to allow for adult flying capacity plus an additional 100 meters buffer)
Consideration of other possible measures		
3.28. Are there effective measures that could be taken in the importing country (surveillance, eradication) to prevent establishment and/or economic or other impacts?	No	Surveillance and eradication would be very demanding for the importing country
Evaluation of risk management options		
3.29. Have any measures been identified during the present analysis that will reduce the risk of introduction of the pest?	Yes	
3.30. Taking each of the measures identified individually , does any measure on its own reduce the risk to an acceptable level?	Yes	

3.31. For those measures that do not reduce the risk to an acceptable level, can two or more measures be combined to reduce the risk to an acceptable level?		
3.32 If the only measures available reduce the risk but not down to an acceptable level, such measures may still be applied, as they may at least delay the introduction or spread of the pest. In this case, a combination of phytosanitary measures at or before export and internal measures (see question 3.29) should be considered.		
3.33. Estimate to what extent the measures (or combination of measures) being considered interfere with international trade.		There are no measures in place in EU countries for many host plants moving between the member states. This would result in interference with internal movement within the EU. For other EPPO member countries or for imports from outside the EPPO region, a PC is required for the import of plants for planting but there will be some additional costs to implement the specific measures. The measures envisaged are common measures for plants for planting.
3.34. Estimate to what extent the measures (or combination of measures) being considered are cost-effective, or have undesirable social or environmental consequences.		The measures are cost effective for the importing country.
3.35. Have measures (or combination of measures) been identified that reduce the risk for this pathway, and do not unduly interfere with international trade, are cost-effective and have no undesirable social or environmental consequences?	Yes	Treatment of the place of production is possible (poplar stands are treated in Argentina) although it is considered that it provides a lower level of protection Physical protection against attacks (The recommendation regarding physical protection of the trunks against attacks of *Megaplatypus mutatus* is based on Italian observations in Campania region. There is no specific data on effectiveness of such measure) Pest-free area Pest-free place of production and buffer zone of 200 meters (the distance of the buffer zone has been set at 200 meters but there is uncertainty on the capacity of flight of the insect)
3.37. Have all major pathways been analyzed (for a pest-initiated analysis)?	No	

Pathway n°2		Round wood of host plants
3.2. Is the pathway that is being considered a commodity of plants and plant products?	Yes	
Existing phytosanitary measures		
3.10. Are there any existing phytosanitary measures applied on the pathway that could prevent the introduction of the pest		The only existing measures are for poplar or conifer wood and not all are appropriate for *M. mutatus* (see pathway 2 point 1.10).
Identification of appropriate risk management options		
Options for consignments		
<u>Detection of the pest in consignments by inspection or testing</u>		
3.11. Can the pest be reliably detected by a visual inspection of a consignment at the time of export during transport/storage or at import?	No	Not reliable. Holes may not be seen and the wood may be covered with bark.
3.12. Can the pest be reliably detected by testing (e.g. for pest plant, seeds in a consignment)?	No	
3.13. Can the pest be reliably detected during post-entry quarantine?	No	
<u>Removal of the pest from the consignment by treatment or other phytosanitary procedures</u>		
3.14. Can the pest be effectively destroyed in the consignment by treatment (chemical, thermal, irradiation, physical)?	yes	Fumigation, heat treatment, chemical pressure impregnation. Note that kiln-drying may be effective only if it fulfils the necessary time/temperature requirements for a heat treatment.
3.15. Does the pest occur only on certain parts of the plant or plant products (e.g. bark, flowers), which can be removed without reducing the value of the consignment? (This question is not relevant for pest plants)	no	
3.16. Can infestation of the consignment be reliably prevented by handling and packing methods?	no	
<u>Prevention of establishment by limiting the use of the consignment</u>		

3.17. Could consignments that may be infested be accepted without risk for certain end uses, limited distribution in the PRA area, or limited periods of entry, and can such limitations be applied in practice?	yes	During winter and provided that wood would be processed before the adult emergence period. Limited distribution in the part of the PRA area where climatic conditions are not suitable
Options for the prevention or reduction of infestation in the crop		
Prevention of infestation of the commodity		
3.18. Can infestation of the commodity be reliably prevented by treatment of the crop?	Yes	Chemical treatment of trees is possible (topical applications) and is performed on poplar stands in Argentina. Nevertheless, no data is available on efficacy and holes are difficult to see. The level of protection for this measure is considered to be lower.
3.19. Can infestation of the commodity be reliably prevented by growing resistant cultivars? (This question is not relevant for pest plants)	No	
3.20 Can infestation of the commodity be reliably prevented by growing the crop in specified conditions (e.g. protected conditions such as screened greenhouses, physical isolation, sterilized growing medium, exclusion of running water...)?	No	
3.21. Can infestation of the commodity be reliably prevented by harvesting only at certain times of the year, at specific crop ages or growth stages?	No	
3.22. Can infestation of the commodity be reliably prevented by production in a certification scheme (i.e. official scheme for the production of healthy plants for planting)?	No	
Establishment and maintenance of pest freedom of a crop, place of production or area		
3.23. Has the pest a very low capacity for natural spread?		
3.24. Has the pest a low to medium capacity for natural spread?	yes	Wood harvested from a Pest-free area or a pest-free place of production

3.25. Has the pest a medium capacity for natural spread?		
3.26. The pest is of medium to high capacity for natural spread		
3.27. Can pest freedom of the crop, place of production or an area be reliably guaranteed?	yes	
<u>Consideration of other possible measures</u>		
3.28. Are there effective measures that could be taken in the importing country (surveillance, eradication) to prevent establishment and/or economic or other impacts?	No	Surveillance and eradication would be very demanding for the importing country
Evaluation of risk management options		
3.29. Have any measures been identified during the present analysis that will reduce the risk of introduction of the pest?	yes	
3.30. Taking each of the measures identified individually , does any measure on its own reduce the risk to an acceptable level?	yes	
3.31. For those measures that do not reduce the risk to an acceptable level, can two or more measures be combined to reduce the risk to an acceptable level?		
3.32 If the only measures available reduce the risk but not down to an acceptable level, such measures may still be applied, as they may at least delay the introduction or spread of the pest. In this case, a combination of phytosanitary measures at or before export and internal measures (see question 3.29) should be considered.		
3.33. Estimate to what extent the measures (or combination of measures) being considered interfere with international trade.	No	The measures proposed are common measures for conifer or *Populus* wood. Extension of the measures to other genera could be regarded as interfering with trade.

3.34. Estimate to what extent the measures (or combination of measures) being considered are cost-effective, or have undesirable social or environmental consequences.		Cost effective for the importing country
3.35. Have measures (or combination of measures) been identified that reduce the risk for this pathway, and do not unduly interfere with international trade, are cost-effective and have no undesirable social or environmental consequences?	yes	Fumigation, heat treatment, chemical pressure impregnation of the wood Treatment of the place of production although it is considered that it provides a lower level of protection Wood originating in a pest-free area Wood originating in a pest-free place of production
3.37. Have all major pathways been analyzed (for a pest-initiated analysis)?	no	
Pathway n°3		Sawn wood of host plants
3.2. Is the pathway that is being considered a commodity of plants and plant products?	yes	
Existing phytosanitary measures		
3.10. Are there any existing phytosanitary measures applied on the pathway that could prevent the introduction of the pest		The only existing measures are for poplar or conifer wood and not all are appropriate for *M. mutatus* (see pathway 3 point 1.10).
Identification of appropriate risk management options		
Options for consignments		
<u>Detection of the pest in consignments by inspection or testing</u>		
3.11. Can the pest be reliably detected by a visual inspection of a consignment at the time of export during transport/storage or at import?	yes	Infestations are easier to detect on sawn wood because of the coloration of wood around the feeding tunnels “pinholes” due to the associated fungus.
3.12. Can the pest be reliably detected by testing (e.g. for pest plant, seeds in a consignment)?	no	
3.13. Can the pest be reliably detected during post-entry quarantine?	no	Not practical
<u>Removal of the pest from the consignment by treatment or other phytosanitary procedures</u>		

3.14. Can the pest be effectively destroyed in the consignment by treatment (chemical, thermal, irradiation, physical)?	yes	Fumigation, heat treatment, chemical pressure impregnation Note that kiln-drying may be effective only if it fulfils the necessary time/temperature requirements for a heat treatment.
3.15. Does the pest occur only on certain parts of the plant or plant products (e.g. bark, flowers), which can be removed without reducing the value of the consignment? (This question is not relevant for pest plants)	no	
3.16. Can infestation of the consignment be reliably prevented by handling and packing methods?	no	
<u>Prevention of establishment by limiting the use of the consignment</u>		
3.17. Could consignments that may be infested be accepted without risk for certain end uses, limited distribution in the PRA area, or limited periods of entry, and can such limitations be applied in practice?	no	Sawn wood, unlike round wood, is often not subjected to further processing and is less easy to trace.
Options for the prevention or reduction of infestation in the crop		
<u>Prevention of infestation of the commodity</u>		
3.18. Can infestation of the commodity be reliably prevented by treatment of the crop?	yes	Chemical treatment of trees is possible (topical applications) and is performed on poplar stands in Argentina. Nevertheless, no data is available on efficacy and holes are difficult to see. The level of protection for this measure is considered to be lower.
3.19. Can infestation of the commodity be reliably prevented by growing resistant cultivars? (This question is not relevant for pest plants)	No	
3.20 Can infestation of the commodity be reliably prevented by growing the crop in specified conditions (e.g. protected conditions such as screened greenhouses, physical isolation, sterilized growing medium, exclusion of running water...)?	No	

3.21. Can infestation of the commodity be reliably prevented by harvesting only at certain times of the year, at specific crop ages or growth stages?	No	
3.22. Can infestation of the commodity be reliably prevented by production in a certification scheme (i.e. official scheme for the production of healthy plants for planting)?	No	
Establishment and maintenance of pest freedom of a crop, place of production or area		
3.23. Has the pest a very low capacity for natural spread?		
3.24. Has the pest a low to medium capacity for natural spread?	yes	Wood harvested from a pest-free area or a pest-free place of production
3.25. Has the pest a medium capacity for natural spread?		
3.26. The pest is of medium to high capacity for natural spread		
3.27. Can pest freedom of the crop, place of production or an area be reliably guaranteed?	yes	
Consideration of other possible measures		
3.28. Are there effective measures that could be taken in the importing country (surveillance, eradication) to prevent establishment and/or economic or other impacts?	No	Surveillance and eradication would be very demanding for the importing country
Evaluation of risk management options		
3.29. Have any measures been identified during the present analysis that will reduce the risk of introduction of the pest?	yes	
3.30. Taking each of the measures identified individually , does any measure on its own reduce the risk to an acceptable level?	yes	

3.31. For those measures that do not reduce the risk to an acceptable level, can two or more measures be combined to reduce the risk to an acceptable level?	-	
3.32 If the only measures available reduce the risk but not down to an acceptable level, such measures may still be applied, as they may at least delay the introduction or spread of the pest. In this case, a combination of phytosanitary measures at or before export and internal measures (see question 3.29) should be considered.	-	
3.33. Estimate to what extent the measures (or combination of measures) being considered interfere with international trade.	No	The measures proposed are common measures for conifer or *Populus* wood. Extension of the measures to other genera could be regarded as interfering with trade.
3.34. Estimate to what extent the measures (or combination of measures) being considered are cost-effective, or have undesirable social or environmental consequences.		Cost effective for the importing country
3.35. Have measures (or combination of measures) been identified that reduce the risk for this pathway, and do not unduly interfere with international trade, are cost-effective and have no undesirable social or environmental consequences?	yes	Fumigation, heat treatment, chemical pressure impregnation of the wood Treatment of the place of production although it is considered that it provides a lower level of protection Wood originating in a pest-free area Wood originating in a pest-free place of production
3.37. Have all major pathways been analyzed (for a pest-initiated analysis)?	no	
Pathway n°4		Wood Packaging material
3.2. Is the pathway that is being considered a commodity of plants and plant products?	yes	
Existing phytosanitary measures		
3.10. Are there any existing phytosanitary measures applied on the pathway that could prevent the introduction of the pest		Yes ISPM 15

3.37. Have all major pathways been analyzed (for a pest-initiated analysis)?	yes	
3.40 Consider the relative importance of the pathways identified in the conclusion to the entry section of the pest risk assessment		
3.41. All the measures identified as being appropriate for each pathway or for the commodity can be considered for inclusion in phytosanitary regulations in order to offer a choice of different measures to trading partners.		
3.42. In addition to the measure(s) selected to be applied by the exporting country, a phytosanitary certificate (PC) may be required for certain commodities. The PC is an attestation by the exporting country that the requirements of the importing country have been fulfilled. In certain circumstances, an additional declaration on the PC may be needed (see EPPO Standard PM 1/1(2): Use of phytosanitary certificates)		

Conclusion of Pest Risk Management. Summarize the conclusions of the Pest Risk Management stage. List all potential management options and indicate their effectiveness. Uncertainties should be identified.		Measures have been selected for all pathways • Plants for planting of more than 15 cm diameter Treatment of the place of production is possible (poplar stands are treated in Argentina) although it is considered that it provides a lower level of protection Physical protection against attacks (The recommendation regarding physical protection of the trunks against attacks of *Megaplatypus mutatus* is based on Italian observations in Campania region. There is no specific data on effectiveness of such measure) Pest-free area Pest-free place of production and buffer zone of 200 meters (the distance of the buffer zone has been set at 200 meters but there is uncertainty on the capacity of flight of the insect) • Round wood Fumigation, heat treatment, chemical pressure impregnation of the wood Treatment of the place of production although it is considered that it provides a lower level of protection Wood originating in a pest-free area Wood originating in a pest-free place of production • Sawn wood Fumigation, heat treatment, chemical pressure impregnation of the wood Treatment of the place of production although it is considered that it provides a lower level of protection Wood originating in a pest-free area Wood originating in a pest-free place of production • Wood Packaging material ISPM n° 15 Wood The measures selected for round wood and sawn wood are common required measures for wood internationally. They are widely accepted and considered effective. **The degree of uncertainty is low to medium it concerns** The absence of specific data on trade of host plant commodities Efficacy of chemical treatments of consignments and places of production. Efficacy of physical protection Distance of the buffer zone

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Annexe 1

Megaplatypus mutatus climatic prediction

Document prepared by the Expert Working Group and reviewed by Alan MacLeod (CSL)

The CLIMEX model is a computer programme aiming at predicting the potential geographical distribution of an organism considering its climatic requirements. It is based on the hypothesis that climate is an essential factor for the establishment of a species in a country.

CLIMEX provides tools for predicting and mapping the potential distribution of an organism based on:
(a) climatic similarities between areas where the organism occurs and the areas under investigation (Match Index),
(b) a combination of the climate in the area where the organism occurs and the organism's climatic responses, obtained either by practical experimentation and research or through iterative use of CLIMEX (Ecoclimatic Index).

Megaplatypus mutatus (Coleoptera: Curculionidae: Platypodidae) is a wood boring pest that attacks a wide range of woody trees, many species of which are grown within EPPO Member States. Unlike many wood boring beetles *M. mutatus* attacks live, healthy, trees within which it creates long, winding galleries. As with other Platypodidae, *M. mutatus* has a symbiotic relationship with ambrosia fungi (Ophiostomatales, Ascoycetes) (Mueller *et al*., 2005) of which little is known about the biology (Malloch & Blackwell, 1993). The beetles carry and spread the fungi which develop in wood galleries.

It is assumed that the environmental conditions within wood galleries will always be moist enough to provide adequate conditions for the development of the fungi. Climatic conditions are therefore not considered to be a limiting factor for the distribution of the fungus. Instead the fungal distribution is assumed to be limited by the distribution of *M. mutatus.*

This analysis focuses on predicting the distribution of *M. mutatus.* The pest can colonize many cultivated and wild tree species found throughout the PRA area, consequently *M. mutatus* is not considered to be limited by host distribution but by climatic conditions. It is noteworthy that *M. mutatus* has been observed near Rio Colorado (Argentina) exclusively on irrigated trees.

1. Geographical distribution

The species is native to South America: Argentina, Bolivia, Brazil, French Guyana, Paraguay, Uruguay and Venezuela. The species was found established in Italy, in Caserta, in 2003 (EPPO, 2004).
There is an uncertainty on the precise distribution of the pest in tropical places. References state that *M. mutatus* is native to subtropical South America. However, Bolivia, French Guyana and Venezuela are all entirely tropical, i.e. are north of the Tropic of Capricorn. No information is available on the situation and vigour of the species in these tropical countries.

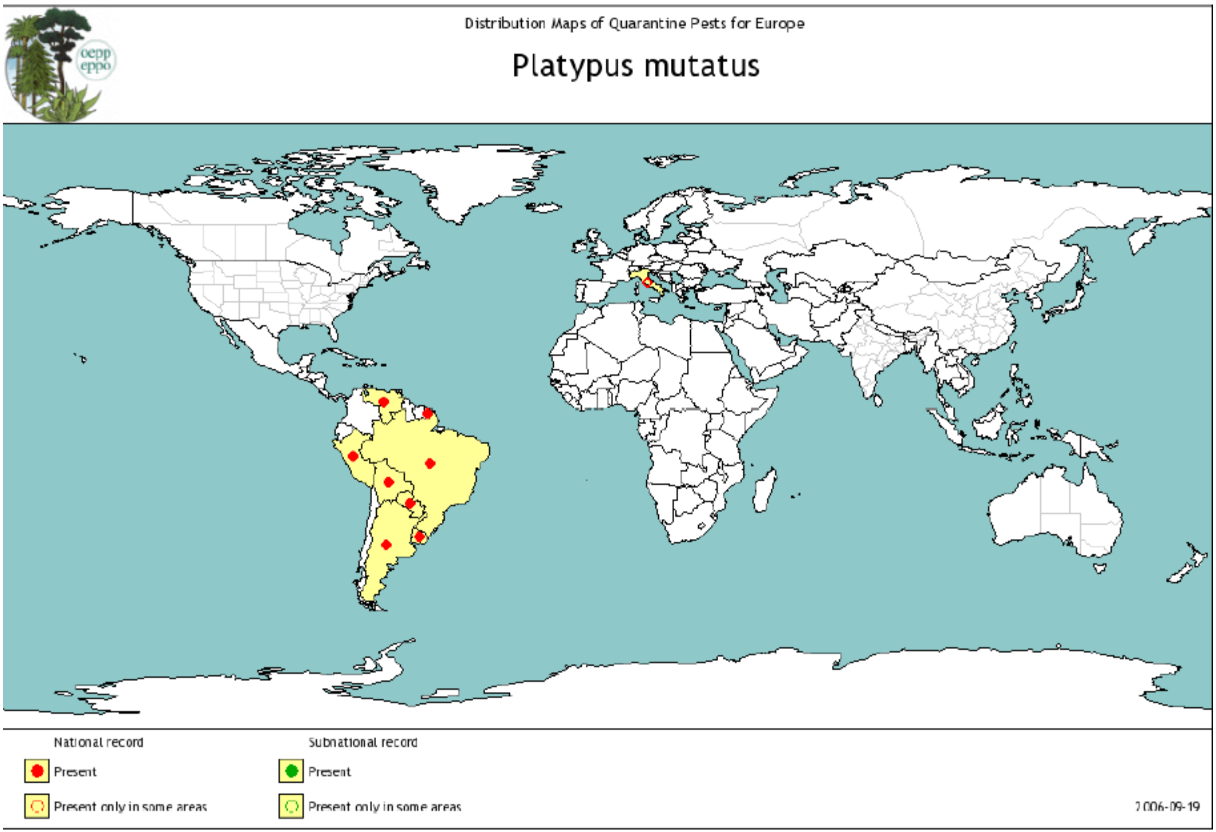


Fig 1: World distribution of *Platypus mutatus*. From EPPO, XXX

Precise distribution is provided for Argentina only:

- plantations located in the paranà River Delta of Buenos Aires province,
- the insect is native to the subtropical area of South America and extended its range south to Neuquén in the Argentinian Patagonia.

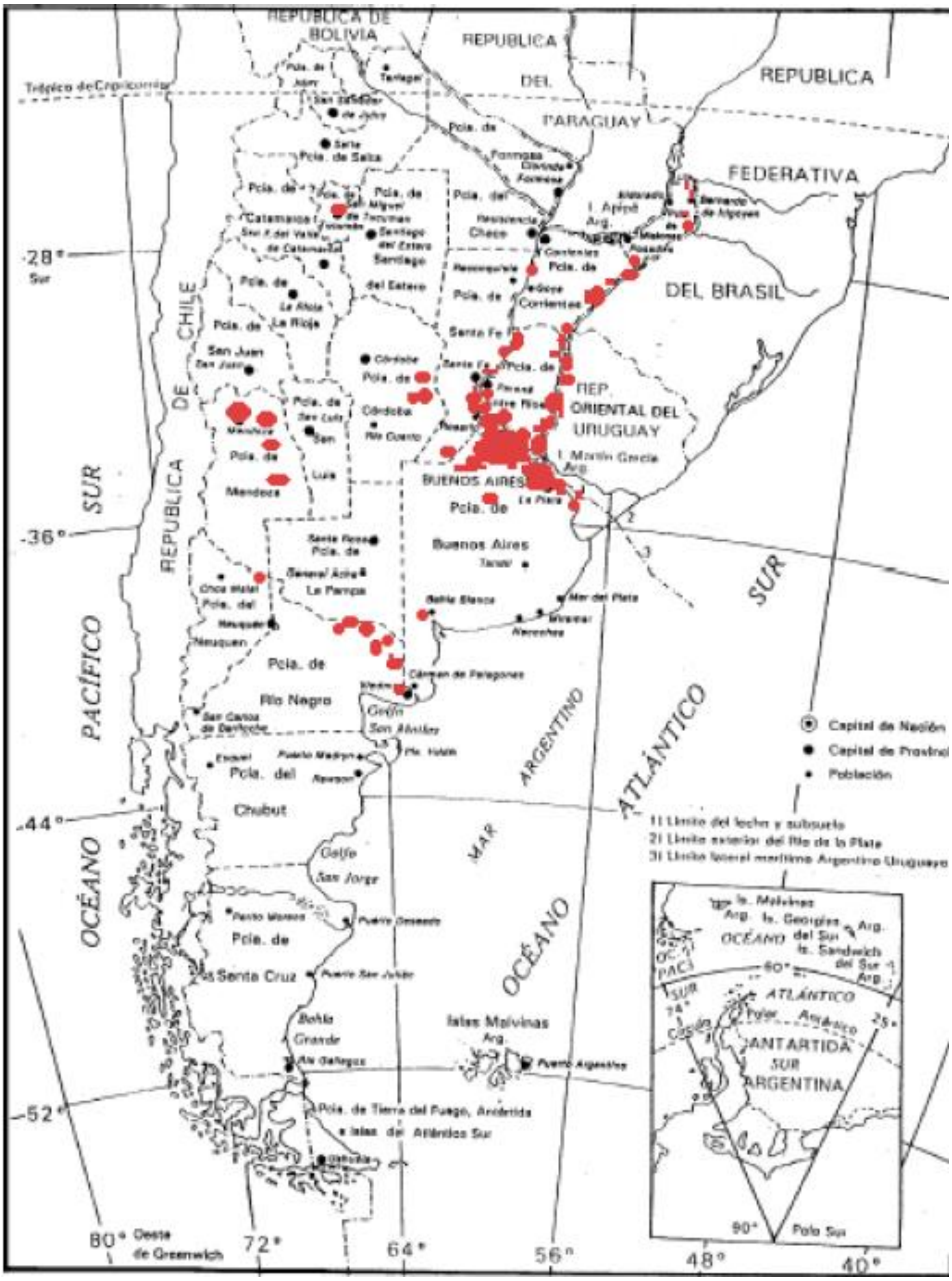


Fig 2: Distribution of *Platypus* (=*Megaplatypus*) *mutatus* in Argentina. From Giménez *et al*., 2003.

Comparing Figure 2 with a map of Argentinian isotherms the pest does not seem to develop below the 12°C isotherm.

2. Biology

- In the southern hemisphere (Argentina), the adults emerge from November to May. In Italy, the adults emerge from May to October.

- the pest is considered to be temperate to sub-tropical, consequently the temperate template is used.

- The pest is thought not to develop in places when the average temperature of the coldest months is lower than 8°C. Santoro (1963) also cites the temperature of 7°C in the same article. The threshold temperature for development (DV0) is consequently set to 7°C. According to Giménez (pers. com.), this value has been criticized as being too high in Argentina, but there is no other data available. There is therefore an uncertainty on this parameter.

- The pest needs a wood moisture content of at least 12% at first and second instars of larval stage, but humidity is less critical for adults (Gimenez, pers. com.)

- The accumulation of degree days per generation is given by Santoro (1963) as 3400°C but no threshold is given although it is noted that temperature sum requires 30 days above 16°C. The lower optimal temperature (DV1) is then considered to be 16°C. The Expert Working Group had some concerns on the figure given by Santoro as it is only based on studies for one population. In addition it considered that this value seems very high compared to the values for other insects (e.g. *Anoplophora glabripennis* which is also a wood boring beetle though being more temperate and is thought to need 1400 DD above 15°C).

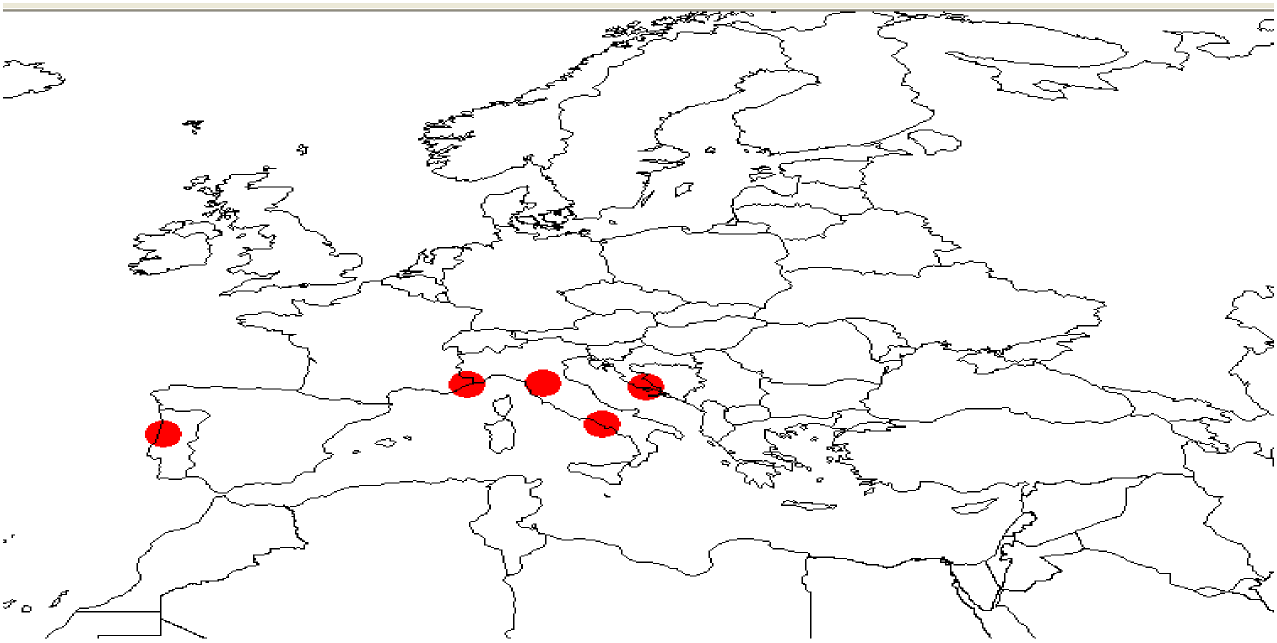
- Nevertheless, the pest has been observed in Patagonia where the minimum absolute temperatures are lower than -15°C, the species being protected in wood galleries. Studies in the laboratory indicate that more than 67% of the larvae do not survive when they are exposed to -2 to -4°C for 2.5 hours or more (Santoro, 1963).

3. Match index

In Argentina heavy attacks occur in the Delta of Paranà River. The closest location in the CLIMEX database is Buenos Aires. All the parameters are set to 1, except the soil moisture which does not interfere in the pest distribution.

Match climate between Buenos Aires (Argentina) and the EPPO region with a match level at 0.7 (70% similarities).

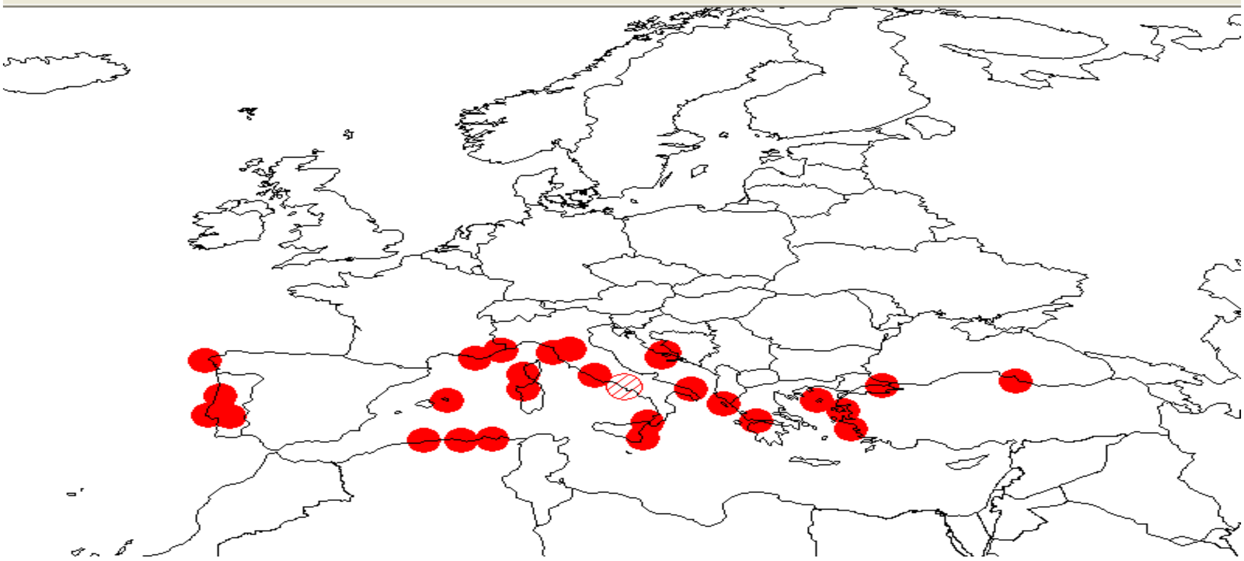
The CLIMEX 1.1 version has been used as the match level cannot be set with the version 2.2.



In its exotic range, the pest is only recorded in Italy, Province of Caserta. The closest city entered in the CLIMEX database is Napoli.

Match climate between Napoli (Italy) and the EPPO region with a match level at 0.7 (70% similarities).

The CLIMEX 1.1 version has been used as the match level cannot be set with the version 2.2.



4. Ecoclimatic index

The following parameters have been set:

Temperature
- DV0: 7 according to Santoro, 1963. In fact, the locations where the species is present in Argentina have minimum temperature averages for the month of November and the following month of development of the pest higher than 7°C.
- DV1: 16 according to Santoro, 1963
- DV2: 30, through a reiterative process this temperature, together with other parameters, seems to give a reasonable match with the known Argentinian distribution.
- DV3: 33 (same comment as for DV2)

Moisture index
The pest is not really sensitive to moisture, except that it depends on the host trees it will find. The soil moisture is linked to the moisture of the vegetation, the pest needs a moisture of at least 12% when at first larvae stage, less when it is an adult.

The moisture parameters have therefore been set to
SMO = 0 (set at the minimum)
SM1 = 0.1 (set at the minimum)
SM2 = 1.5
SM3 = 2.5
Upper optimal moisture remains at 1.5 and limiting high moisture remains at 2.5.

Cold stress
R1: minimum temperatures
The cold stress temperature threshold is set to -10, as it is estimated that to obtain a temperature of 0 or -1 in a tree, the air temperature should approximately be -10.
The cold stress temperature rate is set to -0.01 as the stress could accumulate quite rapidly.

R2: degree-days above threshold
The cold stress degree day rate is set to 0 so the parameter is not taken into account

R3: average temperature
The cold stress temperature rate is set to 0 so the parameter is not taken into account

Heat stress
Heat stress temperature threshold is set to 33 (the upper optimal temperature) since development above this is suboptimal, there should be heat stress above 33°C. The heat stress temperature rate used is 0.05.

Dry stress
Dry stress is set to 0.1, the lower optimal (SMDS) as the species is not thought to be sensitive to drought. Dry stress rate is -0.01.

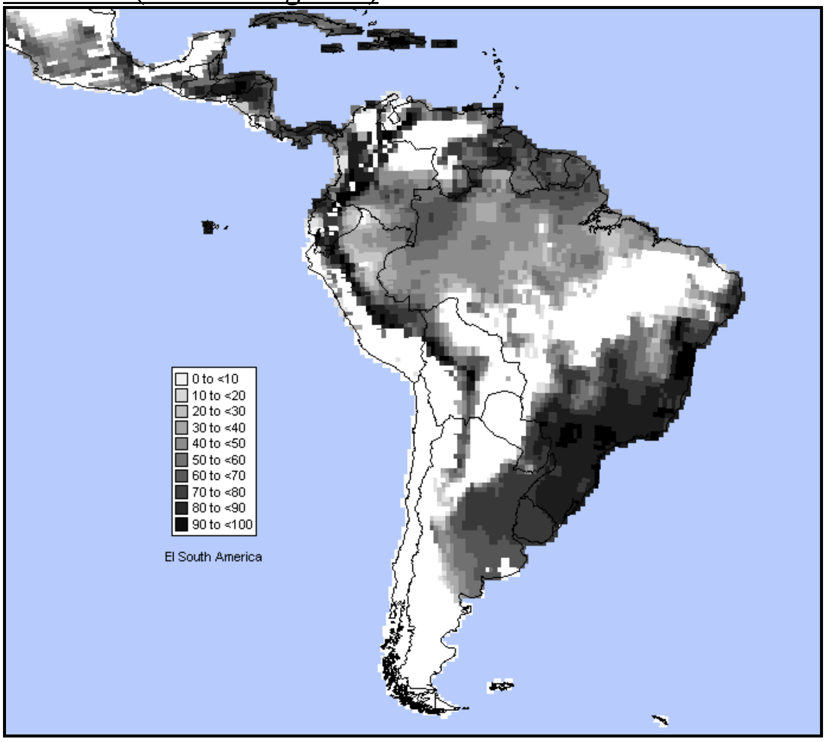
Wet stress
Wet stress threshold remains at 2.5 and wet stress rate at 0.002.

Degree-days per generation
Although Santoro (1963) states that the species needs 3400 dd to complete its cycle, some locations were the species is present (rio Colorado) accumulate 2600 dd per year. The degree-days are therefore set to 2600.
The cold stress DD threshold temperature is set to 7.

Using the above parameters CLIMEX can predict a South American distribution for *M. mutatus* that has EIs at points in the Argentinian/Uruguayan region of between 78 and 85.

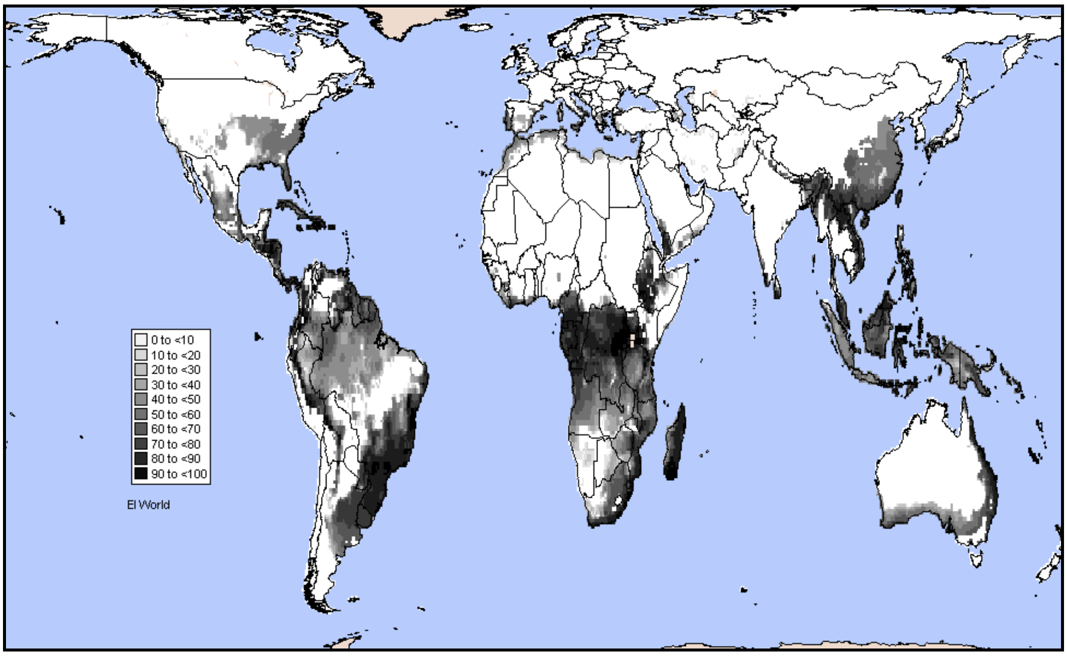
The uncertainty on these maps is medium to high

Compare location for *Megaplatypus mutatus* in South America (detail) with the parameter previously described (with worldgrid30)

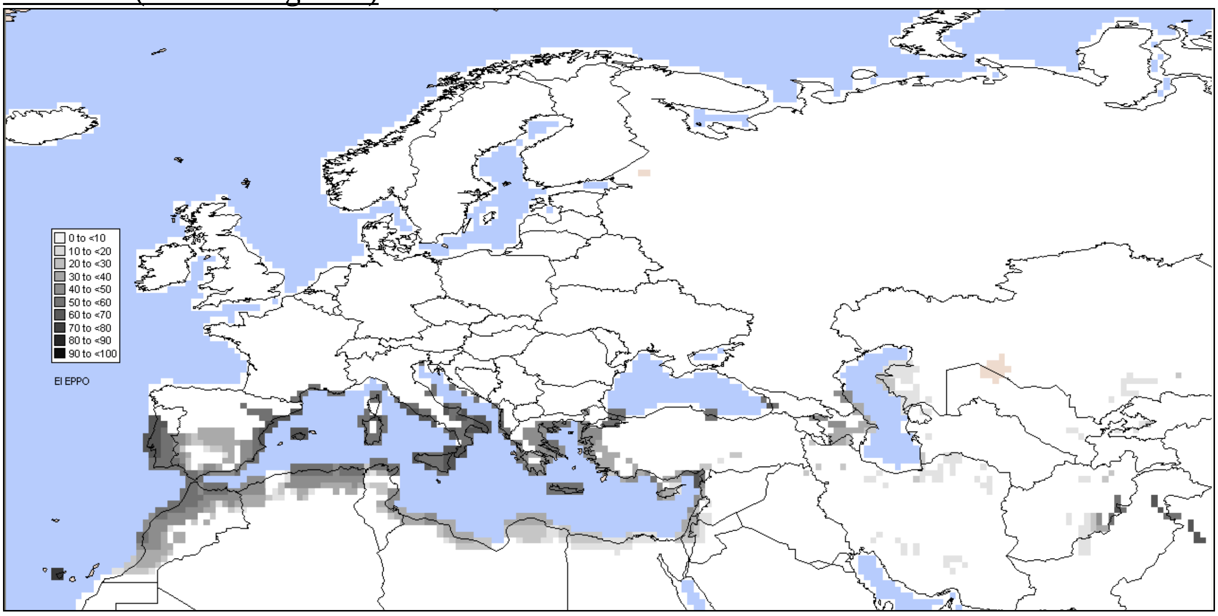


The geographical distribution in South America with the parameter described below map all the locations where the species is present.

Compare location for *Megaplatypus mutatus* in the world with the parameter previously described (with worldgrid30)



Compare location for *Megaplatypus mutatus* in the EPPO region (detail) with the parameter previously described (with worldgrid30)

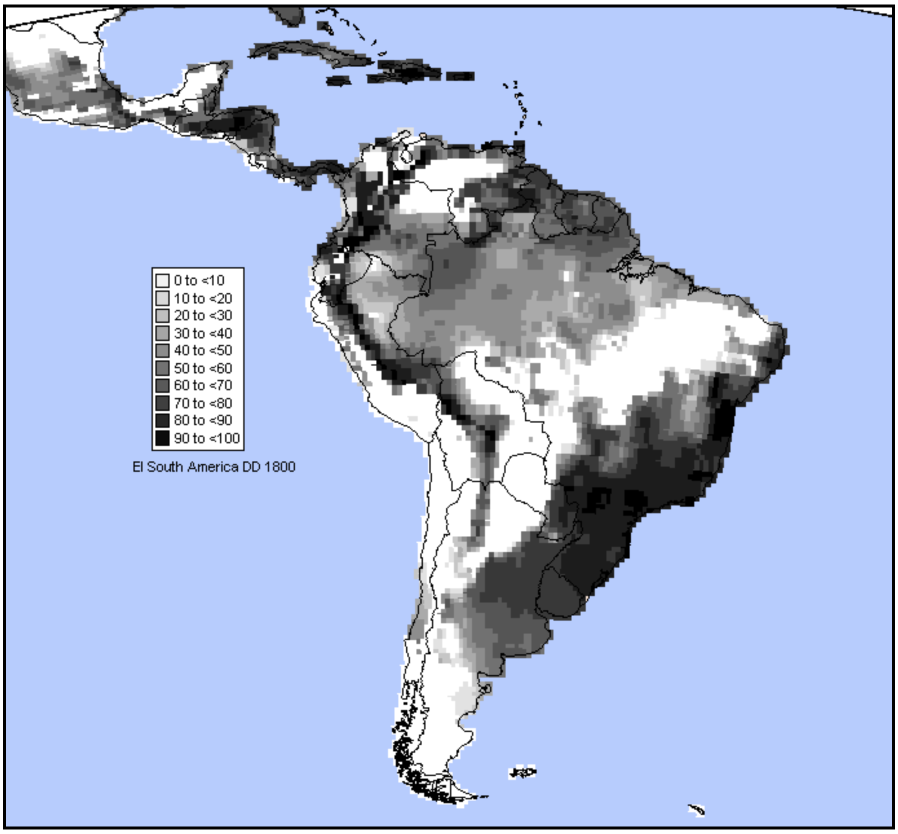


The region at risk is considered to be represented by the Mediterranean coasts. The species is limited in temperate Europe by an insufficient number of degree day accumulation.

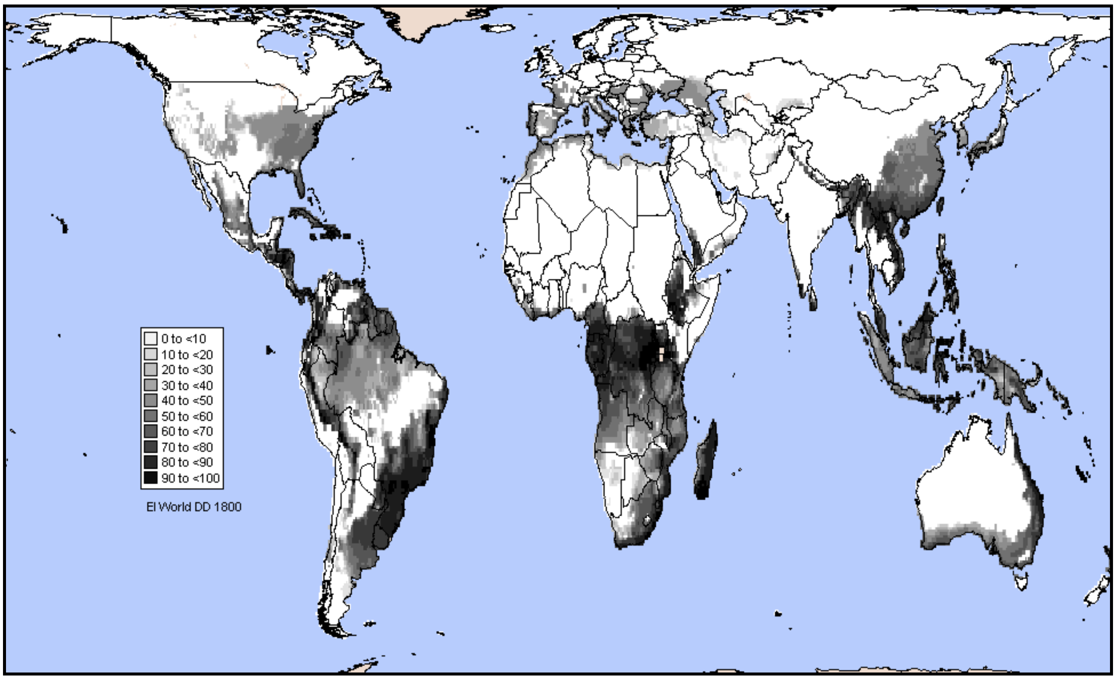
Another scenario is set with the degree days at 1800°C as the experts of the PRA expert group on *Megaplatypus mutatus* considered that the value of 2600°C is very high. As a degree day of 1400°C was used for the climatic prediction of *Anoplophora glabripenis* (MacLeod *et al.*, 2002), the value of 1800°C is assessed. Moreover, the biology of the species has been poorly studied in its native range (no distribution map for other country than Argentina) and its behaviour and adaptability outside its native range has never been studied except in Italy. It is therefore probable that the species could adapt to new conditions.

The uncertainty of these maps is very high.

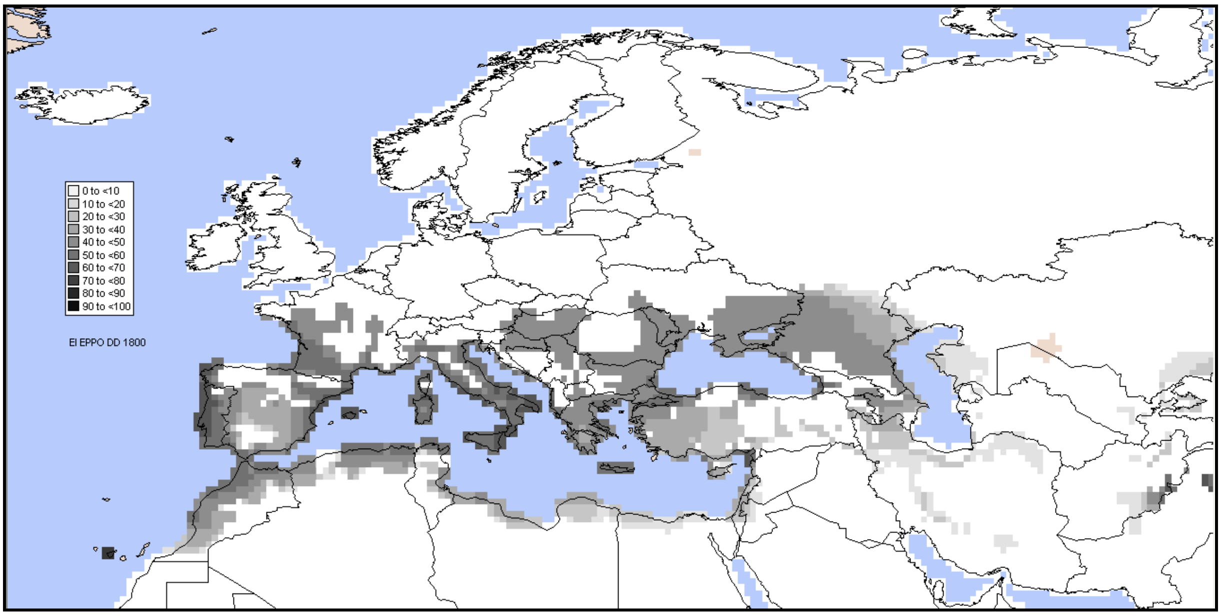
Compare location for *Megaplatypus mutatus* in South America (detail) with the parameter previously described and a DD set to 1800°C (with worldgrid30)



Compare location for *Megaplatypus mutatus* in the world with the parameter previously described and a DD set to 1800°C (with worldgrid30)



Compare location for *Megaplatypus mutatus* in the EPPO region (detail) with the parameter previously described and a Degree Day per generation set to 1800°C (with worldgrid30)



With degree days per generation set to 1800°C, the potential geographical distribution of the pest increases to central Europe.

Conclusion

Both compare location and match climate functions, though having a high degree of uncertainty give the same indications concerning the endangered area.

The Mediterranean coasts are most likely to be at risk, this is confirmed by the fact the species settled in Caserta. The EPPO countries at risk are therefore: Albania, Algeria, Croatia, France, Greece (including Crete), Egypt, Israel, Italy, Lebanon, Montenegro, Morocco, Palestine, Portugal, Romania, Serbia, Spain, Syria, Tunisia, Turkey.

Considering that the species may have a lower degree day per generation requirement than expected, additional countries and provinces may be at risk: the Pianura Padana in Italy there is where extensive production of poplar, Austria, Azerbaijan, Bulgaria, Georgia, Hungary, Moldova, Republic of Macedonia, Romania, Russia, Slovakia, Slovenia, Ukraine.

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